



UNITED STATES PATENT AND TRADEMARK OFFICE

A

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,757	10/08/2003	Pramodh K. Mereddy	03-1142	8286
24319	7590	10/11/2005		
LSI LOGIC CORPORATION 1621 BARBER LANE MS: D-106 MILPITAS, CA 95035				
			EXAMINER MCLEAN MAYO, KIMBERLY N	
			ART UNIT 2187	PAPER NUMBER

DATE MAILED: 10/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

He

Office Action Summary

Application No.

10/681,757

Applicant(s)

MEREDDY ET AL.

Examiner

Kimberly N. McLean-Mayo

Art Unit

2187

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. The enclosed detailed action is in response to the Application submitted on October 8, 2003.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 8-9, 11-12 and 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Galbraith et al. (USPN: 5,537,567).

Regarding claims 1 and 11, Galbraith discloses a plurality of disk drives (Figure 5, References 501, 502, 503, 504) each having a first region (Figure 5, References 511-534; outer diameter region;) and a second region (Figure 5, References 541-544; inner diameter region), wherein the first regions have a performance parameter faster than the second region (Refer to Figure 3; the first region is the outer diameter regions; the outer region(s) is 318 and some or all of 317, the second region is the inner region, Reference 316 and some/none/all of 317; the outer diameter region is physically larger than the inner diameter region and thus can store larger amounts of data thereby providing higher bandwidth/throughput than the inner diameter region) and a controller (Figure 1, Reference 105; C 4, L 43-46) configured to write a plurality of data items in the first region (Figure 5, C 7, L 10-28) and write a plurality of fault tolerance items for the data items in the second regions (Figure 5, C 16, L 14-16; C 6, L 6-9).

Art Unit: 2187

Regarding claim 2, Galbraith discloses the first region for each of the disk drives comprising an annular area of a storage medium proximate an outer edge of the storage media (Refer to Figure 3; the first region is the outer diameter regions; the outer region(s) is 318 and some or all of 317).

Regarding claim 3, Galbraith discloses the second region for each of the disk drives comprising an area of the storage medium between the first region and a rotational axis of the storage medium (Figure 3, the second region is the inner region, Reference 316 and some/none/all of 317).

Regarding claim 8, Galbraith discloses the fault tolerance items as parity (C 16, L 14-16).

Regarding claim 9, Galbraith discloses the disk drive comprising a RAID level 5 (C 2, L 66-67).

Regarding claims 12 and 19-20, Galbraith discloses partitioning an address range for the disk drives into a first range and a second range (Figure 5, the address range is partitioned such that the first range comprises address range logical addr 0 – logical addr $\frac{3}{4}$ Max and the second range comprises the address range logical addr $\frac{3}{4}$ Max – Logical addr Max), wherein the first range has a performance faster than the second range (the first region is the outer diameter regions; the outer diameter region is physically larger than the inner diameter region and thus can store larger amounts of data thereby providing higher bandwidth/throughput than the inner diameter region).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 4-7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galbraith (USPN: 5,537,567) in view of Tomaszewski et al. (PGPUB: US 2002/0188800).

Regarding claim 4, Galbraith discloses the limitations cited above, however, Galbraith does not explicitly disclose the fault tolerance items are copies of the data items. However, Gardner discloses a first and second region, wherein the second region stores copies of the data in the first region (section [0051]; Figure 7). This feature taught by Tomaszewski provides improved reliability (by mirroring), moreover, the technique implemented to improve reliable improves the latency of the system by reducing seek time. Galbraith teaches mirroring across multiple drives (C 6, L 10-15), which improves the performance of the overall multi-drive system. However, the method taught by Tomaszewski reduces the latency within each drive itself (refer to section [0010]) thereby improving the performance of each individual drive and the overall multi-drive system. Hence, one of ordinary skill in the art would have recognized the benefits of Tomaszewski's teachings and would have been motivated to incorporate such teachings in the system taught by Galbraith for the desirable purpose of improved performance.

Art Unit: 2187

Regarding claim 5, Galbraith discloses the use of RAID storage devices, however, Galbraith does not explicitly disclose using a RAID 1 device. RAID level 1 devices are well known in the art for improving reliability by mirroring data stored on the disk devices. One of ordinary skill in the art would have been motivated to use Galbraith's teachings in a RAID level system for the desirable purpose of improved reliability.

Regarding claims 6-7, Galbraith discloses the use of RAID storage devices, however, Galbraith does not explicitly disclose using a hybrid RAID level 1 and level 0 device. RAID level 10 or 01 devices are well known in the art for providing a fault tolerant system by mirroring and striping data. Hence, it would have been obvious to one of ordinary skill in the art to use Galbraith's teachings in a RAID 10 or 01 device for the desirable purpose of providing a fault tolerant system.

Regarding claim 10, Galbraith discloses the use of RAID storage devices, however, Galbraith does not explicitly disclose using a RAID level 6. RAID level 6 devices are well known in the art for providing increased reliability by providing redundant parity for the data. One of ordinary skill in the art would have been motivated to use Galbraith's teachings in a RAID level 6 device for the desirable purpose of providing increased reliability.

6. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galbraith (USPN: 5,537,567) in view of Cassidy (USPN: 6,502,166).

Art Unit: 2187

Regarding claims 13-14, Galbraith discloses the limitations cited above for claim 12, additionally, Galbraith discloses writing a second data item in the first range on the second disk drive (Figure 5, Reference). However, Galbraith does not disclose writing a first fault tolerance item on the second disk drive. Cassidy discloses writing a first fault tolerance item (copy of the first data item – claim 14) on a second disk (refer to Table 1, C 2, first data item A, stored in first disk drive, Drive 1, is mirrored A' in second disk drive, Drive 2). This feature provides improved reliability by providing access to the fault tolerance item when drive 1 fails. Galbraith discloses writing a first fault tolerance item for the first data item in the second range on the first drive and hence if the first disk drive were to fail the fault tolerance item for the first data item would be irretrievable. Hence, one of ordinary skill in the art would have recognized the benefits afforded by Cassidy's teachings and would have been motivated to incorporate such teachings with the system taught by Galbraith, wherein the first fault tolerance item would not just be stored in the second address range, but would be stored in the second address range on the second disk drive, for the desirable purpose of improved reliability.

Regarding claims 15-16, Galbraith and Cassidy discloses writing a second fault tolerance item on a first disk drive for a second data item written on a second disk drive (refer to Figure 2, second data item B, stored in second disk drive, Reference 10, is mirrored B' in first disk drive, Reference 8). Cassidy teaches that this data organization method provides optimal performance for sequential writes and provides scalability across both even and odd numbered disk drives (C 4, L 38-44). Galbraith discloses writing a second fault tolerance item for the second data item in the second range on the second drive and hence if the second disk drive were to fail the parity

Art Unit: 2187

data would be irretrievable. Hence, one of ordinary skill in the art would have recognized the benefits afforded by Cassidy's teachings and would have been motivated to incorporate such teachings with the system taught by Galbraith for the desirable purpose of furthering improved performance.

7. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galbraith (USPN: 5,537,567).

Regarding claim 17, Galbraith discloses the limitations cited above in claim 12, however, Galbraith does not disclose striping the first data item prior to writing the data to the first range and generating the first fault tolerance item by mirroring the first data item after striping.

Galbraith's system uses a RAID 5 system, which inherently does not mirror and stripe. A RAID 0+1 system stripes data and then mirrors the data (fault tolerance data). RAID level 01 devices are well known in the art for providing a fault tolerant system by mirroring and striping data.

Hence, it would have been obvious to one of ordinary skill in the art to use Galbraith's teachings in a RAID 01 device for the desirable purpose of providing a fault tolerant system.

Regarding claim 18, Galbraith discloses the limitations cited above in claim 12, however, Galbraith does not disclose generating the first fault tolerance item by mirroring the first data item and striping the first fault tolerance item prior to writing the fault tolerance item to the second range. Galbraith's system uses a RAID 5 system, which inherently does not mirror and stripe. A RAID 10 system performs mirroring (fault tolerance data) and then striping data. RAID level 10 devices are well known in the art for providing a fault tolerant system by

Art Unit: 2187

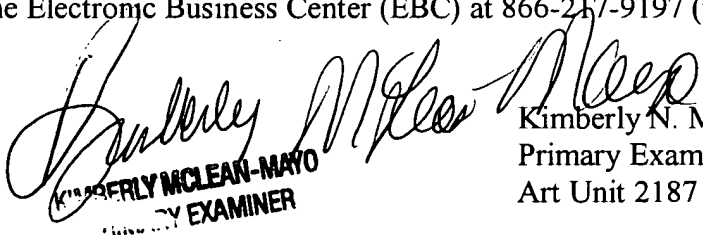
performing both mirroring and striping data. Hence, it would have been obvious to one of ordinary skill in the art to use Galbraith's teachings in a RAID 10 device for the desirable purpose of providing a fault tolerant system.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly N. McLean-Mayo whose telephone number is 571-272-4194. The examiner can normally be reached on Mon (10-4), Tues, Thu (10-2), Fri (10-6:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KIMBERLY MCLEAN-MAYO
Primary Examiner
Art Unit 2187

KNM

September 28, 2005